Frederick J Scheffler

Memorandum

TO: Howard Orlean

Date: Tuesday, March 29, 2016

Subject: Clean up technology for Creosote Contaminated sites

Howard, I have an abiding interest in seeing the Wyckoff site cleaned up. That is to say, I want to be able to walk my two Golden retrievers on the beach in my remaining years. I approached the EPA and subsequently the WA DOE with a possible solution that would clean up the naphthalene plume by converting it in place and removing the end products using the infrastructure you already had in place. I have attached the summaries of those approaches, the last being in 2009. I am working with a group of men that are committed to formulating economic and effective innovative alternative solutions to problems that face the environment with the end result that we will create economic opportunities for Veterans in new industries.

In 2003, I approached the EPA with an offer to personally underwrite the costs of the testing. Initially it was accepted but subsequently I was advised that the individual who had accepted it was no longer with the EPA and we could not move forward. In 2009 I approached the WADoE, a copy of which I have included. That was never acknowledged.

In subsequent public discussions the DOE represented that they were looking for new solutions to the Wyckoff cleanup but publicly dismissed out of hand anything that involved microbial applications. The statement was made that" *they knew it would not work*". They never tested the solution but they knew it would not work. It is 17 years later and the site is still not cleaned up. Warning signs punctuate the landscape and no viable solution is on the horizon.

The greatest impediment to innovative solutions is a predetermination that it will not work. With that in mind I and my colleagues concentrated our efforts elsewhere. Within the next six months a project in Georgia will be breaking ground. It will be known as the PEACHWORKS and will be located in the Turtle River Global Logistics Park. The PEACHWORKS was conceived as "*An Incubator for Innovation"* precisely because of experiences such as what I described. Unfortunately, this resistance to new concepts or alternative solutions that may unsettle some existing interests is not unique. The project is attracting startup companies with synergistic solutions that can be integrated and deployed. None of them think "outside" the box rather, they have thrown away the "box". There are a plethora of problems that can be remedied but it is made difficult, but not impossible, when the greatest obstacle is those responsible for the oversight.

It is my sincere hope that that is no longer the case regarding the Wyckoff site as it could be the innovator of a solution that could be duplicated in hundreds of sites across the country.

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What are we proposing as a solution to Creosote (naphthalene) contamination?

The process proposed involves breaking up the naphthalene with enzymes and microbes and retrieving the end product with the wells already in operation on the site. I believe that in a 12 month period it could ultimately leave less than 100 ppm residue in the now contaminated soil. The description of the naphthalene plume as being impervious to microbial treatment prevented any consideration, but the process that has been used to rejuvenate marginal oil wells disputes that conclusion. In the oil fields the microbes broke down the paraffin and the asphaltenes releasing the oil to be brought to the surface in the injected water.

The process uses proprietary microbes and extracellular lipase enzymes. These microbes were cultured and environmentally stressed. The "expression profile" of their DNAs, as well as their RNA, were adjusted. This is why they are unique and "obligately aerobic ", not requiring additional Oxygen from exterior sources. They remain aerobic in an anaerobic environment. Since the enzymes are "non-living", "Nanobots" for lack of a better word, they aren't affected by harsh chemicals such as chlorinated or phosgenated compounds. The enzyme is both "bi and trident" or actually has tentacles removed from molecule to molecule with, and break the covalent bonds at the double bonded sites. This explains the diverse amount of compounds that are produced from simple alkane or aliphatic raw materials.

The experiences in the oil fields are important because they mirror the conditions at Wyckoff.

It is a unique treatment approach that could affect an actual "cleanup" that is more effective, economic and most importantly, timely. Cleaning rather than just containing ran contrary to the designs and course of action established as far back as the Town hall meetings of 1993

Oil Field application

I N S I T U R E F I N I N G

In the life cycle of an oil well productivity diminishes for two primary reasons; the lighter oil with higher hydrogen content is pumped leaving a heavier residual with higher carbon content and bottom hole pressure is reduced. The reservoirs under most U.S. wells drilled in the past century may still hold twice the amount of oil that has been sucked to the surface. The reason is Geology 101: Oil is locked in the pores of rock layers deep below the ground. Sink a hole into such a layer and the pressure of the earth above squeezes out the oil. But as it oozes out, pressure on the remaining oil diminishes. The hydrogen in the formation has been reduced by taking off the natural gas, gasoline & diesel. That leaves too much carbon in the formation and not enough hydrogen……hydrocarbons. The product left in the formation is too heavy to get to the surface & still make money.

This process involves deploying enzymes produced by a proprietary microbial spectrum. In the process there are no microbes that will consume the hydrocarbon. In the heavier carbon content materials the enzymes break with a DC charge the double carbon bonds into 3-5 carbon units and split off the hydrogen.

It becomes a self-sustaining *In Situ* refining process whereby the end products are *Hydro Cracked* creating a lighter hydrocarbon. {Nano-Technology} Paraffin becomes a beneficial component because the action of the enzymes results in *Hydro cracking* the paraffin thus creating recoverable diesel, kerosene, naphthalene and gasoline compounds. It also splits the water creating source of Oxygen-Hydrogen and Hydroxyl {Oh radical}

In the coal application, the reaction removes the *pyridine*, the sulfur based material that makes coal hard. The pyridine converts to *pyrol,* a food additive. This process also uses the CO2 and nitrogen entrained in the coal and asphaltenes by combining the carbon to the hydrocarbon and oxygen and building these into organic acids or alcohols…or they are used by the microbes.

These microbes are *obligately* aerobic and are programmed through their expression profile to split the water and derive their oxygen from it or from the CO2.

The enzymes use the energy liberated from the free electrons from the orbits of the outer shell bond of the CO2 or H2O and actually gain energy from this displacement. This is why the enzymes retain such a high* charge *similar to that of an alkaline battery.

Summary

The process is important for two reasons;

- ***It is not a Green House Gas source. It is performed cold and releases minimal CO2.***
- ***It is a cost effective solution to recovering commercially viable hydrocarbon products from under-producing oil wells with paraffin or asphaltenes problems. Using an enzyme process tailored to increasing the volume of liquid fuels from paraffin, asphaltenes, coal & cellulose by breaking double carbon bonds, it creates highly active sites of carbon uniquely suited for combining hydrogen, oxygen and hydroxyl radicals with which to build new products.***

I have included the test results and copies of my original correspondence.

Our goal is to create economic opportunities for Veterans across the country who will be newly integrated into an economy that is not ready for them. There are hundreds of sites such as Wyckoff in various states that have not been “cleaned” but only “contained”. To that end we are working with institutions of higher learning in various states to validate what I have referenced. We created a simple bench test, which I have included. For the results to have any validity, a sample of contaminant in a Superfund site such as Wyckoff should be the test material.

When I first requested samples from Wyckoff I was told that they were contaminants and could not be removed from the site for testing by private individuals who were not the contractors of record. In light of that I would like to have necessary samples provided directly to the institution that will be doing the testing from the EPA team responsible for Wyckoff. If this is agreeable, please provide me with the individual who can facilitate this.

One of the other applications for this cleanup process if “desalinization”. It has worked in the oil fields with the water used in the well rejuvenation process. I am looking to applying this, not to create potable water but, to provide water for agriculture in California. The energy needed to drive the generators could be supplied by the solar power and we are going to apply for funding to perfect this application. The company that will be bringing these various technologies to market is Yorkhouse Environmental Technologies, a Service Disabled Veteran Owned Company.

Please review the attached materials and let me know if there are any questions. I anticipate that researchers from, possibly both, University of Georgia and North Carolina University will be the sites of the bench tests.

I look forward to any suggestions that you may have.

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